

**CLAIMS**

What is claimed is:

1. A cartridge locking device for holding a filter in a filter plenum,  
5 comprising:

an actuating member extending through an opening defined by a wall of a plenum for a filter and movable from a first position to a second position; and

a lever member connected to the actuating member inwardly of the plenum and having a distal end for bearing against a filter disposed within the plenum, the  
10 lever member movable between a first position holding a filter in the plenum responsive to the actuator being in the first position and a second position spaced apart from the filter for removing the filter from the plenum,

whereby the actuating member moving between the first and second positions moves the lever member between the first and second positions relative to the filter.

15

2. The cartridge locking device in claim 1 further comprising a resilient member disposed between the plenum and a first end of the lever member to bias the first end of the lever member away from the wall of the plenum.

20 3. The cartridge locking device in claim 2 further comprising a pivot on an inner portion of the plenum on which the lever member moves to bear a second end against the filter when the lever member is in the first position.

4. The cartridge locking device in claim 3 further comprising a locking  
25 member received on the actuating member outwardly of the plenum for securing the

actuating member in the first position, said locking member movable from an un-locked position to a locked position.

5        5. The cartridge locking device in claim 4 further comprising a fastener that connects the lever member and the actuating member.

6. The cartridge locking device in claim 3 wherein the lever arm moves between a biased position and an unbiased position relative to the pivot upon moving the actuating member between its first and second positions.

10

7. The cartridge locking device in claim 1 further comprising a locking member received on the actuating member outwardly of the plenum for securing the actuating member in the first position, said locking member movable from an un-locked position to a locked position.

15

8. The cartridge locking device in claim 4 wherein the locking member being in its un-locked position, the lever member moves between alignment and un-alignment relative to the filter upon moving the actuating member between its first and second positions.

20

9. The cartridge locking device in claim 4 wherein the activating member being in its first position, the lever arm moves between an away position and a bearing position relative to the filter upon moving the locking member between an un-locked position and a locked position.

25

10. The cartridge locking device in claim 7 wherein the locking member being in its un-locked position, the lever member moves between alignment and un-alignment relative to the filter upon moving the actuating member between its first and second positions.

5

11. The cartridge locking device in claim 7 wherein the activating member being in its first position, the lever arm moves between an away position and a bearing position relative to the filter upon moving the locking member between an un-locked position and a locked position.

10

12. The cartridge locking device in claim 1 wherein the lever member defines an opening in a first end that receives the actuating member.

13. The cartridge locking device in claim 12 wherein a portion of the  
15 actuating member is threaded.

14. The cartridge locking device in claim 5 wherein the fastener and a portion of the actuating member are threaded, the fastener threadably engaging the actuating member to connect the lever member and the actuating member.

20

15. The cartridge locking device in claim 14 wherein the locking member is threaded.

16. The cartridge locking device in claim 13 wherein the locking member  
25 moves longitudinally guided by the threads

17. The cartridge locking device in claim 1 wherein the resilient member is a spring.

5           18. The cartridge locking device in claim 1 wherein the actuating member being in a first position, the lever member bears against a bearing surface on the filter.

19. The cartridge locking device in claim 18 wherein the bearing surface is a palm button.

10

20. The cartridge locking device in claim 19 wherein the palm button comprises a bearing member coupled to a filter.

21. A cartridge locking device for holding a filter in a filter plenum,  
15 comprising:

a pivot member extending through an opening defined by a wall of a plenum for a filter and movable between a first position and a second position;

a lever member connected to the pivot member inwardly of the plenum and having a distal end for bearing against a filter disposed within the plenum, the lever  
20 member movable in a first plane between a first position and a second position relative to the filter and in a second plane between a first position and a second position relative to the pivot;

a resilient member for biasing a first end of the lever member away from the wall of the plenum; and

a pivot on an inner portion of the plenum on which the lever member moves when the lever member is in the first position relative to the filter;

whereby the pivot member moving between the first and second positions moves the lever member between the first and second positions relative to the filter.

5

22. The cartridge locking device in claim 21 wherein the resilient member is a spring.

23. The cartridge locking device in claim 21 further comprising a locking  
10 member received on the pivot member outwardly of the plenum for securing the pivot member in a first position, said locking member movable between an un-locked position and a locked position.

24. The cartridge locking device in claim 23 wherein the locking member  
15 being in its un-locked position, the lever member moves between alignment and un-alignment relative to the filter upon moving the pivot member between its first and second positions.

25. The cartridge locking device in claim 23 wherein the activating member  
20 being in its first position, the lever arm moves between an away position and a bearing position relative to the filter upon moving the locking member between an un-locked position and a locked position.

26. The cartridge locking device in claim 23 wherein the pivot member being  
25 in its first position, the lever arm moves between a biased position and an unbiased

position relative to the pivot upon moving the locking member between a locked position and an un-locked position.

27. The cartridge locking device in claim 21 wherein the lever member  
5 defines an opening in the first end that receives the pivot member.

28. The cartridge locking device in claim 21 further comprising a fastener that engages the pivot member to connect the lever member and the pivot member.

29. The cartridge locking device in claim 28 wherein the fastener is a  
10 threaded nut.

30. The cartridge locking device in claim 21 wherein a portion of the pivot member is threaded.

15 31. The cartridge locking device in claim 30 further comprising a threaded fastener for threadably engaging the threaded portion of the pivot member to connect the lever member and the pivot member.

32. The cartridge locking device in claim 30 wherein the locking member  
20 moves longitudinally guided by the threads.

33. The cartridge locking device in claim 30 further comprising a pair of washers received on the threaded end of the pivot member, said washers disposed on opposite sides of the wall.

34. The cartridge locking device in claim 30 wherein the lever member defines an opening in the first end that receives the threaded pivot member.

35. The cartridge locking device in claim 21 wherein the pivot member is L-shaped.

36. The cartridge locking device in claim 30 further comprising a threaded locking member received on the pivot member outwardly of the plenum for securing the pivot member in a first position, said locking member movable between an unlocked position and a locked position.

37. The cartridge locking device in claim 23 wherein the locking member is a handle.

38. The cartridge locking device in claim 23 wherein the locking member is a threaded bore.

39. The cartridge locking device in claim 38 further comprising a pair of arms.

40. The cartridge locking device in claim 21 wherein the pivot member being in a first position, the lever arm bears against a bearing surface on the filter.

41. The cartridge locking device in claim 40 wherein the bearing surface is a palm button.

42. The cartridge locking device in claim 41 wherein the palm button comprises:

a bearing member;

5 a flange extending from one side of the bearing member and defining a threaded recess;

a threaded shaft received in the recess; and

a filter that defines a threaded channel for threadably securing the filter to a distal end of the shaft

10 whereby the shaft threads into the recess and the channel to secure the bearing member to the filter.

43. A cartridge locking device for holding a filter in a filter plenum, comprising:

15 an actuator member extending through an opening defined by a wall of a plenum for a filter and movable between a first position and a second position;

a lever member connected to the actuator member inwardly of the plenum having a distal end for bearing against a filter disposed within the plenum, the lever member movable in a first plane between a bearing position and a spaced-apart  
20 position relative to the filter and in a second plane between an alignment position and an un-alignment position relative to the filter;

a locking member received on the actuator member for securing the pivot member in the first position, said locking member movable between a locked position and an un-locked position;



a resilient member that biases a first end of the lever member away from the wall of the plenum; and

a pivot on an inner portion of the plenum on which the lever member moves in the first plane;

5           whereby with the locking member being in the un-locked position, the lever member moves between alignment and un-alignment relative to the filter upon moving the actuator member between the first and second positions for replacement of the filter within the plenum and

          whereby the actuator member being in the first position, the lever arm moves  
10   between the bearing and spaced-apart positions relative to the filter upon moving the locking member between the locked and un-locked positions for holding the filter in the plenum.

          44. The cartridge locking device in claim 43, wherein the resilient member is  
15   a spring.

          45. The cartridge locking device in claim 43, wherein the lever member defines an opening in the first end that receives the pivot member; and further comprising a fastener that secures the lever member to the actuator.

20

          46. The cartridge locking device in claim 45, wherein the locking member and a portion of the pivot member are threaded, and the fasteners comprise a nut.

47. The cartridge locking device in claim 43, further comprising a pair of washers received on the threaded portion of the pivot member, said washers disposed on opposite sides of the wall.

5           48. The cartridge locking device in claim 46 wherein the locking member comprises a handle threadably received on the threaded portion of the pivot member outwardly of the plenum.

          49. The cartridge locking device in claim 48 further comprising a threaded  
10 fastener that threadably engages the threaded portion of the pivot member to connect the lever member and the pivot member.

          50. The cartridge locking device in claim 49 wherein the fastener is a threaded nut.

15           51. The cartridge locking device in claim 46 wherein the locking member defines a threaded bore; whereby the locking member is received on the threaded portion for longitudinal travel thereon.

20           52. The cartridge locking device in claim 51 wherein the locking member further comprises a pair of arms for grippingly moving the locking member.

          53. The cartridge locking device in claim 46 wherein the locking member moves longitudinally guided by the threads on the actuator member.

54. The cartridge locking device in claim 43 wherein the plenum supports a filter therein and the filter defines a bearing surface whereby the lever member bears against the bearing surface on the filter.

5 55. The cartridge locking device in claim 54 wherein the bearing surface is a palm button.

56. The cartridge locking device in claim 55 wherein the palm button comprises a bearing member secured to the filter.

10

57. The cartridge locking device in claim 56 wherein the palm button further comprises:

a flange extending from a first one side of the bearing member and defining a threaded recess; and

15 a shaft that connects the bearing member to the filter

whereby the shaft threads into the recess and the channel to secure the bearing member to the filter.

58. The cartridge locking device in claim 56 further comprising a threaded nut  
20 disposed on the distal end of the shaft.

59. A method of operating a cartridge locking device to hold a filter in a filter plenum and release the filter during replacement operations, comprising the steps of :

(a) moving an actuating member from a first position to a second position, said actuating member extending through an opening defined by a wall of a plenum for a filter and connecting therein to a lever member; and

(b) moving the lever member between a first position holding the filter in the plenum responsive to the actuator being in the first position and a second position spaced apart from the filter for removing the filter from the plenum,

whereby the actuating member moving between the first and second positions moves the lever member between the first and second positions relative to the filter.

60. The method as recited in claim 59 further comprising the step prior to step (a) of moving a locking member from a locked position to an unlocked position to place the actuating member in the first position.

61. The method as recited in claim 60, wherein the step prior to step (a) causes the lever member to move from the first position holding the filter in the plenum to an intermediate position spaced-apart from the filter.

62. The method as recited in claim 59, further comprising the steps of:

(c) moving the lever arm to an intermediate position aligned with a replacement filter in the plenum; and

(d) moving the actuating member to the first position,

whereby the lever member move to the first position bearing against the replacement filter to hold the replacement filter.